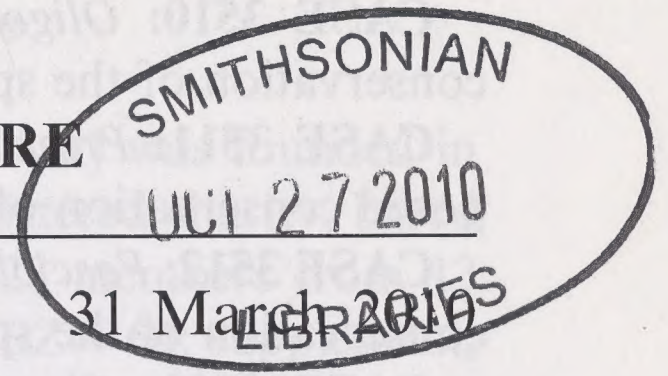


BULLETIN OF ZOOLOGICAL NOMENCLATURE

Volume 67, part 1 (pp. 1–118)

**Notices**

(1) Applications and correspondence relating to applications to the Commission should be sent to the Executive Secretary at the address given on the inside of the front cover and on the Commission website. English is the official language of the *Bulletin*. Please take careful note of instructions to authors (present in a one or two page form in each volume and available online at <http://www.iczn.org/guidelines.html>) as incorrectly formatted applications will be returned to authors for revision. The Commission's Secretariat will answer general nomenclatural (as opposed to purely taxonomic) enquiries and assist with the formulation of applications and, as far as it can, check the main nomenclatural references in applications. Correspondence should be sent by e-mail to 'iczn@nhm.ac.uk' where possible.

(2) The Commission votes on applications eight months after they have been published, although this period is normally extended to enable comments to be submitted. Comments for publication relating to applications (either in support or against, or offering alternative solutions) should be submitted as soon as possible. Comments may be edited (see instructions for submission of comments at http://www.iczn.org/Instructions_for_comments.html).

(3) Requests for help and advice on the Code can be made direct to the Commission and other interested parties via the Internet. Membership of the Commission's Discussion List is free of charge. You can subscribe and find out more about the list at <http://list.afriherp.org/mailman/listinfo/iczn-list>.

(4) The Commission also welcomes the submission of general-interest articles on nomenclatural themes or nomenclatural notes on particular issues. These may deal with taxonomy, but should be mainly nomenclatural in content. Articles and notes should be sent to the Executive Secretary.

New applications to the Commission

The following new applications have been received since the last issue of the *Bulletin* (volume 66, part 4, 18 December 2009) went to press. Under Article 82 of the Code, the existing usage of names in the applications is to be maintained until the Commission's rulings on the applications (the Opinions) have been published.

CASE 3508: *Maculinea* Van Eecke, 1915 (Lepidoptera, LYCAENIDAE): proposed conservation over *Phengaris* Doherty, 1891. E. Balletto, S. Bonelli, J. Settele, J.A. Thomas, R. Verovnik & N. Wahlberg.

CASE 3509: *Cetonia squamosa* Gory & Percheron, 1842 (currently *Aethiessa squamosa*) (Insecta, Coleoptera): proposed conservation of the specific name. I. Sparacio.

CASE 3510: *Oligosoma ornatum* (Gray, 1843) (Reptilia, Squamata): proposed conservation of the specific name. G.B. Patterson.

CASE 3511: *Prionocerus bicolor* Redtenbacher, 1868 (Insecta, Coleoptera): proposed conservation of the specific name. M. Geiser.

CASE 3512: *Fasciolaria granosa* Broderip, 1832 (Mollusca: Gastropoda): proposed conservation of the specific name. M.A. Snyder, W.G. Lyons & G.J. Vermeij.

CASE 3513: *Chaetosoma* Westwood, 1851, *Apodasya* Pascoe, 1863, *Apodasya pilosa* Pascoe, 1863 and CHAETOSOMATIDAE Crowson, 1952 (Insecta, Coleoptera): proposed conservation. Y. Bousquet & P. Bouchard.

CASE 3514: Proposed removal of homonymy between the family-group names ENHYDRINI Gray, 1825 and ENHYDRINI Régimbart, 1882. H. Özdikmen & M.C. Darilmaz.

CASE 3515: *Rhynchotherium* Falconer, 1868 (Mammalia, Proboscidea): proposed conservation of usage by designation of *Rhynchotherium falconeri* Osborn, 1923 as the type species. S.G. Lucas.

CASE 3516: *Scapsipedus micado* Saussure, 1877 (currently *Velarifictorus micado*; Orthoptera, GRYLLIDAE): proposed conservation of usage of the specific name by the designation of a neotype. S.W. Heads & A. Ichikawa.

CASE 3517: LATRIDIIDAE Erichson, 1842 (Insecta, Coleoptera): proposed precedence over CORTICARIIDAE Curtis, 1829; and *Corticaria* Marsham, 1802: proposed conservation of usage by designation of *Corticaria ferruginea* Marsham, 1802 as the type species. Y. Bousquet, P. Bouchard & N.P. Lord.

CASE 3518: *Cornu* Born, 1778 (Mollusca, Gastropoda, Pulmonata, HELICIDAE): proposed validation of the generic name. R.H. Cowie.

CASE 3519: *Eumolpus* Weber, 1801, *Chrysochus* Chevrolat in Dejean, 1836 and *Bromius* Chevrolat in Dejean, 1836 (Insecta, Coleoptera, CHRYSOMELIDAE, EUMOLPINAE): proposed conservation of usage. A.G. Moseyko, E. Sprecher-Uebersax & I. Löbl.

Solene Morris – ICZN Secretariat, BZN Zoologist

Solene Morris (1944–2010) was a part of the team at the ICZN Secretariat when she was diagnosed with cancer in 2008. In her time at the ICZN she prepared many Cases for the BZN and worked with three consecutive Executive Secretaries, Philip Tubbs, Andrew Wakeham-Dawson and Andrew Polaszek.

Solene studied biology, geology and medicine at the University of Connecticut, U.S.A. She did fieldwork on glacial sedimentation on the coast of New England, and worked as a research assistant to Prof. Karl Waage of Yale University on Late Cretaceous faunas from the Dakotas. She moved to the UK in 1971 where she curated coelenterates and then molluscs, with an emphasis on bivalves, in the Zoology Department of the Natural History Museum, London (NHM). In 1989 she was seconded to the Royal College of Surgeons to look after Down House, the historic home of Charles Darwin, and to curate the collections there until 1996.

She is survived by her husband Noel and daughter Nichola who both work in the department of Palaeontology at the NHM.

She made substantial contributions to the work of the ICZN and her enthusiasm for nomenclature, taxonomy and museum sciences will be greatly missed.

The International Trust For Zoological Nomenclature

The International Trust For Zoological Nomenclature (the Trust) was founded in 1947 to manage the Commission's financial matters. It is a registered charity, based in the U.K. (No. 211944). At present, the Trust consists of 28 members from 13 countries. Discussion of the Trust's activities can be found in BZN 60: supplement, pp. 1–12 (March 2003).

Members of the Trust

- Dr M. Dixon (U.K.) (Chairman and Director)
- Dr H.M.F.P. André (Belgium)
- Dr M.N. Arai (Canada)
- Mr H.S. Barlow (Malaysia)
- Prof D.J. Brothers (South Africa) Commissioner
- Ms M.J. Clifford-Turner (U.K.) Treasurer & Managing Director
- Mr P. Cooke (U.K.)
- The Earl of Cranbrook (U.K.)
- Prof R.A. Fortey (U.K.)
- Prof J.I. dos R Furtado (Singapore)
- Dr M.K. Howarth (U.K.)
- Prof T. Jones (U.K.)
- Dr S. Knapp (U.K.)
- Prof Dr O. Kraus (Germany)
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- Mr A. McCullough (U.K.)
- Dr E. Macpherson (Spain)
- Prof A. Minelli (Italy) Commissioner
- Dr T. Nishikawa (Japan)
- Dr J.L. Norenburg (U.S.A.)
- Dr M.J. Oates (U.K.)
- Mr R. Pethiyagoda (Sri Lanka)
- Dr A. Polaszek (U.K.)
- Mr N.J. Robinson (U.K.)
- Ms R. Sangster (U.K.)
- Dr H.-D. Sues (U.S.A.)
- Dr S. Tillier (France)
- Dr A. Wakeham-Dawson (U.K.)

Contributions to the Discussion on Electronic Publication IV

Introduction

This is the fourth instalment of comments on the ICZN proposed amendment on electronic-only publication, which would allow publication of nomenclatural acts on exclusively electronic media to be valid and available. The proposed amendment is available in the BZN 65: 265–275, several other sources, and online at http://www.iczn.org/electronic_publication.html. We have sought input from all stakeholders in this process, including taxonomists, publishers, archivists, database experts and the wide range of users of nomenclatural information. The IUBS has approved the principles underlying the proposed amendment.

As you will see from the following contributions, some new perspectives continue to be raised and new information is coming to light that may affect the acceptability of this proposed amendment to the community. The date for the Commission's vote has not yet been set. We will initiate a new method for making Comments available online on the ICZN website in advance of the print copy of the BZN, thus we will welcome further contributions on this topic in the near future. We also encourage continued debate through listservers (e.g. ICZN listserver (<http://list.afriherp.org/mailman/listinfo/iczn-list>) and Taxacom (<http://mailman.nhm.ku.edu/mailman/listinfo/taxacom>)) and the various journals that have published the proposed amendment.

Ellinor Michel

Svetlana Nikolaeva

Natalie Dale-Skey

Steve Tracey

(1) Alfred L. Gardner

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Although I am against electronic publishing of nomenclatural work, I realise that such a change is inevitable. As you may know, *Mammalian Species* is electronically published except for a limited number of hard copies distributed to a select number of institutions worldwide. Unfortunately, these hard copies are distributed once per year as a set for that year, yet each copy bears the date when it was supposedly available. Although I have argued that these *Mammalian Species* accounts often contain nomenclatural acts (such as when a unique name combination is used), which is unavoidable because of their synthetic nature, my arguments have been ignored. According to the current Code, the date for these nomenclatural acts must be cited as the last day of the year the printed version is made available.

Nevertheless, to 'borrow' from the *Mammalian Species* example, electronic publishing of nomenclatural work might be acceptable if the journal or other organ

publishing such research were to provide free electronic copies in PDF format of these individual works/publications to a select number of museums and other institutions throughout the world at the time the report was made available electronically. Those museums and other institutions would each have to agree to place that 'publication' on their institutional website, and provide access to the scientific community free of charge.

(2) Paul Callomon

Malacology Department, Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, PA 19103-1101, U.S.A. (e-mail: callomon@ansp.org)

Further to my comments at the recent AMS meeting in Ithaca, I am against the Code permitting electronic-only publication. This is because:

(a) With the number and kind of forums for broadcasting content increasing daily, I do not believe that this is a sensible time to be changing the rules. The requirement that a work be printed is neither onerous nor unreasonable now that printing can be done locally and cheaply, though it should be a stipulation that to be available papers should at least appear in a journal with a verifiable ISSN number. This does not preclude desk-top printing, it just means that you have to register your journal.

(b) From my long experience with 'grey' journals in Malacology, I do not believe that even a good majority of those publishing electronically would archive their work in the prescribed fashion, or at least do it within a reasonable time frame. This would leave a froth of works in cyberspace that may or may not be available, or available from an indeterminate date, with the onus being on the reader to establish their status. I can't see how that would help us at all.

(c) The transition of a work from an electronic or typed manuscript to a printed copy is an act that is very difficult to perform without creating some kind of record independent of the work itself. This transformation from one physical state to another has proven invaluable time and again in establishing the date of publication of a work decades (and often centuries) after everyone involved in its creation perished.

An example: it was long known that several versions of Tadashige Habe's (1961) book *Colored Illustrations of the Shells of Japan II* existed. In the late 1990s, Dick Petit and I managed, with some effort, to assemble 19 of the 21 known printings. By comparing them page by page we were able to establish that the author's practice of communicating changes direct to the printers each time they reprinted it meant that this book had seven versions. Along the way, Habe introduced new names, all of them in years subsequent to 1961. The title page retained that date almost to the end, however, and the only way to determine when certain names were introduced was to refer to the printers' marks on a copy of the version in which they first appeared. The physical existence of these books made this possible, even after 45 years, and we were able to publish a full collation of the work (as *Venus supplement*, no. 3) that gave the correct dates for all the new taxa. In some cases, this had a bearing on synonymy, which made it an even more useful exercise.

The main objection to conventional journal publication is that it takes too long. Editors wait until they have enough manuscripts for an issue, and a delay in the

review of one holds them all up. The *Zootaxa* model effectively dealt with this problem, and I'm all in favor of every scientific journal adopting that model. Nevertheless, *Zootaxa* does lodge a printed version in a number of libraries, and this has yet to even slightly slow down the headlong pace of its growth. In summary: Let's not do something just because we can. Let's do only what we should, and change only what we must.

(3) Mario Elgueta

Entomología, Museo Nacional de Historia Natural, Casilla 787, Santiago (21), Chile (e-mail: melgueta@mnhn.cl)

I consider that paper publication will always be preserved and, it is true, each day taxonomists around the world are working with copies of books and journals 200–300 years old. On the other hand, I think the preservation of electronic information is not assured and many experts actually consider it to be a serious problem.

I know that today rapid publication of papers may be necessary, often as a consequence of administrative pressure on researchers based on institutional and/or national policies. Many online journals offer alternatives to this problem.

On a practical level I do not have a negative opinion of electronic versions but I consider it fundamental that we assure the continuity of printed versions of journals. I think the combined publication options (online plus printed) is both possible and a satisfactory solution.

(4) Hans Malicky

Sonnengasse 13, A -3293 Lunz am See, Austria

According to Article 8 of the present Code, a publication must fulfil the following conditions:

8.1.1. it must be issued for the purpose of providing a public and permanent scientific record, and

8.1.3. it must have been in an edition containing simultaneously obtainable copies by a method that assures numerous identical and durable copies.

Publication on the internet cannot fulfil these conditions for the following reasons.

1. Documents on the internet may be changed or replaced at any time, so the permanent scientific record of the original version is not necessarily available. Promises not to change such a document are not credible as there is no way that anyone outside can prevent this.

2. Documents on the internet are only available as long as someone pays for the presentation. If the person or institution ceases payment (e.g. following bankruptcy), the document disappears and is lost. Promises to prevent this happening are not credible. For this reason a permanent scientific record and durable copies are not available.

3. It is well known that the internet is subject to tampering by the military, by dictatorships and by illegal hackers. For this reason too, a permanent scientific record and durable copies are not available.

The conclusion is that publication of documents for the purposes of zoological nomenclature on the internet must not be permitted. Taxonomic work is hard enough and we do not want more difficulties. Remember the controversial decision in the last edition of the Code to accept publication on CD (Article 8.6) which apparently will now be cancelled.

It is certainly useful to publish an internet version in addition to the printed one but the printed version must remain the reference version, and must decide the date of publication. A reasonable number of printed copies (I suggest 100 instead of the 25 proposed in recommendation 8B) must be produced and distributed. With today's printing techniques it is no problem to print copies and to put the document onto the internet simultaneously. So I am asking the Commission not to allow electronic-only publication of such documents on the internet. Instead, the proposed 'Recommendation 8C. *Ideally names and nomenclatural acts published in electronic works should also be published simultaneously on paper*' should be declared as an obligatory regulation, i.e. '*Names and nomenclatural acts published in electronic works must also be published simultaneously on paper.*'

I have discussed this point in the last few months with many colleagues from a number of countries. Most are strongly in favour of obligatory publication on paper. There is no objection to a simultaneous publication on the internet if the deciding version is on paper. If however the Commission votes to permit electronic-only publication, I foresee the following: some colleagues will try to read both paper and internet versions but will not be happy about the additional trouble and loss of time. Some colleagues will reject and ignore electronic-only publications, while others will only accept electronic publications.

I leave it to your imagination what this would mean for the future. We might expect an increasingly divergent nomenclature and the end of stability.

Proposed Article 8.4.1

'Copies must be printed on paper using ink or toner.' The English word 'ink' translates to four different meanings in German: 'Tinte', 'Tusche', 'Druckfarbe' or 'Druckerschwärze'. The correct meaning in this case is 'Druckerschwärze'. It would be useful to express that more clearly.

Proposed Recommendation 8A

This section lists 'appropriate scientific journals' or 'well-known monographic series', but what about separate books?

Proposed Article 9

'What does not constitute published work . . .' In the 3rd edition of the Code (1985) hectographing is not forbidden but only declared an 'undesirable process' (Recommendation 8A). In the 4th edition (1999) this process is not mentioned. Therefore, nomenclatural acts in hectographed publications after 1985 are available. It would be quite unacceptable if they were now made retrospectively unavailable 25 years later. A number of generic and specific names which have been in general use until now would then become invalid, which contradicts any fundamental law. This sentence should therefore be inserted: '9.2. *after 2009, works produced by hectographing or mimeographing*'.

(5) Adam Farquhar

Head of Digital Library Technology, The British Library, Wetherby, West Yorkshire LS23 7BQ, U.K. (e-mail: Adam.Farquhar@bl.uk)

Scholarly communication has clearly entered the digital age. Researchers, however, have a strong focus on the here and now – on accessing and exchanging current results, new observations, and new theories. This focus is, to some degree, at odds with the goals of organisations such as the International Commission on Zoological Nomenclature (ICZN). Such organisations and the communities that they represent take the long view. The names that we give to things are lasting and the ICZN needs to ensure that the basis for these names lasts as long as the names themselves – hundreds or thousands of years.

Over the last few years, the ICZN has been evaluating the proposal to extend the definition of valid publication in the Code of zoological nomenclature to include digital publication of new scientific names and other nomenclatural acts. There are two underlying challenges that any proposal has to meet. Will the bits be accessible? In the field of digital technology this is referred to as the bit-level preservation challenge. It includes the need to ensure that the digital record has not been tampered with. Will researchers be able to make sense of them? This is referred to as the content-level preservation challenge.

Fortunately, these challenges are not unique to zoological nomenclature. Addressing them is an active area for organisations that have a responsibility to preserve our scientific and cultural heritage. National libraries and archives have been leading many of the efforts in this area, sometimes with strong and effective support from bodies such as the European Commission and national governments.

Since 2004, I have been involved in designing and implementing the British Library's response to the challenge of ensuring long-term access to digital material, as well as leading the PLANETS project (Preservation and Long-term Access through Networked Services, www.planets-project.eu/about/), a major digital preservation initiative co-funded by the European Union. In this comment, I draw from my experience to highlight some of the recent progress relevant to the questions facing the ICZN in consideration of accepting validity from e-only publication.

The first challenge is to ensure that the bits are there. For paper documents, this is relatively easy to ensure. If paper is stored in a cool dry environment, it can easily last a hundred years or more. It lends itself to passive preservation approaches.

Digital media are different. There are two reasons for this. First, we are only at the beginning of the digital age and are still in a period of rapid innovation. There will be major changes in the approaches that we use to storing digital information in the coming years. I expect these changes to be as great as the ones we saw moving from stone to clay tablets or from vellum to printed paper. Second, the digital media that we happen to have stumbled upon also happen to be short-lived. In part, this is because the design pressures have emphasised speed and density, not longevity. Because of this, digital media require an active preservation approach.

At the British Library we actively manage our storage media. We regularly refresh disks and tapes, copying the digital collections from one generation of storage devices to the next. This enables us to take advantage of rapid advances in storage

technology as it becomes faster, denser, and more energy efficient. Our overall systems are designed to be heterogeneous so that we can mix different generations of technology together at any time.

Just like paper, digital media are subject to all sorts of disasters. The buildings that they are stored in can be damaged by fire, flood, or earthquake. We address this by holding multiple copies of every digital object in our collection. They are distributed geographically, with copies in London, Yorkshire and Wales. An additional location is planned for Scotland. Digital media can also fail, resulting in damage to individual digital objects. We address this by monitoring every object on a regular (currently monthly) basis to ensure that the bits have not been damaged. This level of checking is impossible on a paper collection, due to the cost of manual examination. If we find a single bit out of place, we are able to retrieve a copy from one of the other locations. Unlike paper documents, the digital copies are bit-for-bit perfect. This approach – distributed sites, active refresh, bit-level monitoring and repair gives us a high level of confidence that we will not lose the bits over a very long time.

Ensuring that no one can tamper with the record requires some additional steps. The British Library creates a time-stamped digital signature of every object that it stores in its digital library. This enable us to guarantee not only that an object is exactly what it was when we received it, but also the time at which we received it. The approach has a sound mathematical basis and the implementation satisfies the rigorous FIPS 140 Level 2 standard for cryptographic modules. This ensures that we can detect any tampering such as someone inserting or modifying an object. In addition, we follow best practices for physical security and independent management of the different sites. This approach gives us a high level of confidence that the bits will not be modified or tampered with.

Overall, the state-of-the-art around bit-level preservation is mature. Best practice organisations, such as the British Library, the National Archives of the U.K., the National Archives and Royal Library of the Netherlands, the Austrian National Library, the Swiss Federal Archives and the Danish Royal Library, to name some of the leaders in this area, have considerable experience ensuring long-term bit-level preservation.

The second challenge is to ensure that we can make sense of the bits. For paper documents, this is relatively easy to ensure. We can directly perceive the drawings, images and words that are on the pages. Of course, there can be real problems making sense of the words without understanding the language, jargon, and background knowledge that the authors assumed. Digital objects are different. They are represented using specific file formats that rely on software and hardware to render them. Again, the rate of innovation makes this challenge more acute. The design pressures have not been on developing long-lived digital objects, but on providing new capabilities and features. A digital document from 1980 was typically designed to be printed and read from start to finish. Nonetheless, the file formats could be very complex. A twenty year old digital document may be very challenging to read or print using today's software. Furthermore, while digital documents today are often designed for printing, they are likely to have embedded components such as images, audio, video, or data; internal and external links; and dynamic interactive components. This complexity makes the problem worse.

The choice of specifying the type of carrier, CD or DVD, in the current edition of the Code on Methods is an interesting one. It highlights the bit-level versus content-level preservation issue. Optical media in this class are subject to more rapid degradation than originally thought – that is the bits are likely to be lost. Specifying the medium, however, places no constraint on the content! Perhaps the content is encrypted, incorrectly written, or in a format that no-one but the author can understand.

Fortunately, there has been considerable attention lavished on overcoming the content preservation challenge. This has resulted in substantial progress in improving our understanding, developing tools, and providing services that enable us to (1) provide access to older digital content and (2) increase our confidence that we will be able to access today's digital content well into the future. Techniques that were viewed as experimental a few years ago, such as providing emulation environments for obsolete hardware platforms, are now quite practical. Other techniques, such as migrating content to new formats, are now rather well understood and part of the day-to-day work of best-practice organisations.

Before concluding, I would like to raise an issue about the Open Archival Information System Standard (OAIS) referenced in the proposed amendment. The OAIS standard provides a valuable shared vocabulary and useful guidance for anyone architecting an archival system. Compliance, however, does not provide any guarantee of the quality or trustworthiness of an archival service. There have been several subsequent activities (e.g. TRAK, Drambora, DINI) that have taken steps in this direction.

The community engaged in zoological nomenclature has a long tradition of stewardship and some unique requirements for both print and digital material that support naming acts. Fortunately, many of the concerns that they have expressed about the resilience and durability of the digital record are shared by others. National libraries and archives with support from many sides have been actively working on ensuring this durability. As the value of digital material escalates, it becomes impossible for this wider community not to find and integrate robust solutions.

The question for the zoological nomenclature community is when to fully accept digital material as supportive of naming acts and what special requirements, if any, does it need to articulate. My recommendation is (1) to accept digital material now, but with the stated preference for printed material; (2) to exploit existing processes and infrastructure, such as the U.K.'s electronic legal deposit infrastructure that deeply intertwined with the mission of long-lived organisations; (3) do not over-specify acceptable formats, but establish a light process for managing the set of acceptable formats; and (4) have some confidence that society as a whole will find satisfactory solutions to ensure that digital material is accessible and durable.

(6) Alain Dubois

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Registration as a fourth floor of the nomenclatural process

Introduction

Since the establishment of the Code (first as the 'Règles'), in order to become available, a 'scientific name' or nomen (Dubois, 2000) or a nomenclatural act had to be published in a permanent document produced as a series of identical copies such as a printed book or a paper in a periodical. However, the Commission has recently announced its intention to change this rule by making possible the introduction of an available name or act in a document published online, i.e. a virtual electronic document. This is planned to be coupled with the establishment of an Official Register of Zoological Nomenclature (Zoobank), where all names and nomenclatural acts are supposed to be ultimately registered. This proposal is a dramatic one, certainly the most important one ever suggested for the Code since its implementation. This proposed change raises numerous problems, some of which have already been discussed in this Bulletin, others elsewhere (Dubois, 2007c, 2008a, c; Carlos & Voisin, 2009), others through the web, in particular in online forums, and others only personally among colleagues during informal discussions in various countries. These problems are of various kinds, including technical ones such as the fact that electronic publication, communication and archiving are 'technique-dependent', which questions their long-term permanency and accessibility, both in times of peace and war, and philosophical, ethical and societal ones including their dependence on private profit-making companies, which questions their long-term financial sustainability and scientific autonomy, the control of their contents, or their worldwide permanent accessibility. To this can be added the highly questionable proposal to give a 'blank cheque' to the Commission for deciding on the new methods of production, distribution, formatting or archiving that will be considered Code-compliant (Article 8.6). Several of these questions were aptly presented in this Bulletin by Welter-Schultes et al. (BZN 66: 215–219). An important point which has apparently escaped the attention of many contributors to this discussion is the current 'poor understanding of nomenclature (professionals included)' (Löbl, BZN 66: 307–308) which is the result both of the absence of academic teaching of this discipline in most countries and of the low competence in this domain of many editors of periodicals and books (Dubois, 2003). Most users of the Internet and of online databases do not master nomenclatural rules at all, and it can be predicted with certainty that, if online publication of new names is authorised, they will not differentiate between names published and registered online through authorised media and those published through others not recognised by the Code, so that nomenclatural chaos is bound to develop, at least on the Web. This is exemplified by the current (December 2009) co-existence in the different language versions of Wikipedia of at least nine pages devoted to the famous Galapagos pink iguana recently described, including six where it is incorrectly designated as '*Conolophus rosada*', an unavailable name, and three

where it is correctly named *Conolophus marthae*, the available name of this species. Many other examples of invalid zoological nomenclature on the web are easy to find.

The purpose here is not to come back to all these problems in detail, but to propose a new solution in this complex discussion. Two distinct questions are at stake here, that will be considered separately: (1) the possibility of making a name or act available through electronic publication, without paper publication, and (2) the registration of names and acts in Zoobank.

Allowing nomenclatural availability though electronic publication

As shown recently in detail for some rules of the Code concerning the spellings of names (Dubois, 2010a), the Code is a very complex and fragile construction, being the result of a centenarian 'trial and error' process. It is not a 'beanbag nomenclatural system' in which isolated rules would be independent from each other and could be changed without consequences to other rules and to the overall functioning of the system. This is why changes should be brought to the Code only with great care. In particular, a sufficient period of critical study of the consequences of the proposed changes should be respected, allowing all interested zootaxonomists worldwide to have enough time to examine them in detail, not only in an abstract way, but also concretely, for example through a critical and long-term experience of the functioning of the Zoobank site. This site is currently too incomplete and contains too many mistakes to be able to play the role, potentially very useful indeed for all taxonomists, that it is supposed to play. Will the Commission prove able in the long run to keep this site functioning and to obtain the funds allowing registration in this database of the millions of zoological names already available, with accurate information on their status? As a matter of fact, this work cannot be expected of individual zootaxonomists, as they have another important priority, namely to make haste in the discovery, collection, description and naming of the myriads of animal species that are currently becoming extinct on our planet (Dubois, 2003). Ten years at least would seem to be the minimum required for such a testing period. Let us just await 2020 and see what has been the fate of Zoobank then. This is a very short period compared to the 250 years during which paper publications have been in use in zootaxonomy, through countless wars, social crises and natural catastrophes worldwide. This period should be used to organise open discussions about these proposed changes among all interested taxonomists in the world, in particular in national societies and congresses, that more people are likely to attend than international congresses, which mostly zoologists from North America and Europe have the financial ability to attend. Considering that most of the yet-to-be-described species of the planet are in the tropical areas of the world, zootaxonomists of these regions should be closely associated with the discussion of these proposed changes. This has not been the case until now if we consider the contributors of the texts published in this Bulletin or on the Zoobank online forum (see Dubois, 2008a,c). The participation in these discussions does not reflect the current situation of zootaxonomy worldwide, as can be illustrated by recent data concerning the papers published in *Zootaxa*, the most productive journal in zootaxonomy ever (Zhang, 2006). From 2001 to 2009, among 6512 authors for which the *Zootaxa* website provides data, 1856 (28.5 %) were working in Europe and 1174 (18.0 %) in North America, i.e. a total of 3030 (46.5 %

of the total). The other two most productive regions were South and Central America, with 1747 authors (26.8 %) and East Asia, with 1068 authors (16.4 %), i.e. a total of 2815 authors (43.2 % of the total). In contrast, the current Commission counts 11 members (39.3 %) from Europe and 7 (25.0 %) from North America, i.e. a total of 18 members (64.3 % of the Commission), for 1 (3.6 %) from South America and 5 (17.9 %) from East Asia, i.e. 6 members (21.4 % of the Commission). The U.S.A., which provided 1057 *Zootaxa* authors (16.2 %) are represented in the Commission by 7 members (25.0 %) but China, with 544 authors (8.4 %) has only one Commissioner (3.6 %) and Brazil, with 997 authors (15.3 %) has no member in the Commission. Although these data are only indicative as they bear on a single journal during 9 years, they strongly suggest that the Commission is not representative of the current international community of zootaxonomists.

Any final decision regarding the implementation of such a major change of the Code should not be taken by a small group of persons such as the Commission, but collectively, democratically, through a vote during an international congress convoked especially for this purpose, for example in Brazil or China, and supported by funds allowing all interested zoologists worldwide to attend, 'as the Code is the collective property of all zootaxonomists who agree to follow its Rules' (Dubois, 2008a p. 17). Doing differently might lead some zootaxonomists to stop following the Code and, for example, to join some of the alternative nomenclatural systems that have flourished in recent years, clearly as a result of problems in the Code (Laurin, 2007; Dubois, 2008c), or to adopt a local, nation-centered or language-centered nomenclature for animals, which would be catastrophic for the unity and good functioning of biological sciences.

In the meantime, the rules of availability of names and nomenclatural acts should not be modified. As well argued by Welter-Schultes et al. and Löbl, among others, availability should remain attached to paper publication, and I endorse Welter-Schultes et al.'s figure of 100 originally printed copies. These authors further suggested that 30 of these paper copies should be deposited in major libraries identified in the publication. I would rather suggest a number of 40 libraries, with an additional qualification, namely that they should be distributed worldwide, with 5 copies in each of the 8 following major regions: Africa, Central and South America, North America, Eastern and Southern Asia, Western Asia, Europe, Oceania and Sunda region. These 40 copies should be sent free to these libraries by the publishers. Brian Taylor wrote about the figure of 30 libraries: 'I cannot envisage there being more than perhaps 20 major libraries that would or could conserve paper copies for posterity'. Well, posterity may be a rather long period, indeed . . . but probably several hundred libraries in Europe alone, have so far been able to conserve the early books and periodicals of human culture, including zoology, for 250 years already. We can expect that they will do the same for the next 250 years if no social, political or ecological catastrophe destroys our civilisation. Of course, such predictions are gratuitous as nobody knows what the future will be, but this is an additional reason to be prudent regarding electronic databases and communication networks. This is not a question of optimism or pessimism but of implementing the 'principle of precaution', according to which, in the absence of a scientific consensus, that no harm would ensue, the burden of proof would fall on those who advocate taking an action, and in the meantime the action should be postponed.

Paper publication has shown to be an effective way of disseminating and preserving information over centuries. In particular, it has gone through two terrible World Wars and many other regional conflicts, which destroyed millions of humans but also many human creations including cultural ones. Electronic communication and archiving still have to demonstrate that they have the ability to do so. Some supporters of the Commission's project have an optimistic approach to this problem: 'it is unconceivable that investments in electronic databases such as those for genome sequences or astronomical data will be allowed to disappear' (Knapp et al., 2007, p. 262). Well, this may be inconceivable, but it could occur – and it did indeed occur, as in the cases of NASA's moon-mission files or of the Voyager spacecraft missions cited by Welter-Schultes et al., and others that I mentioned at the 2007 Linnean Society meeting (see Discussion below). Everybody worldwide hopes that there will be no more major international or national wars, but wars still exist on this planet, and it is not inconceivable that major ones will burst out again, especially in view of the climatic, ecological and economic catastrophes that may be ahead of us. We know that paper databases have survived major conflicts but we have no way of knowing if electronic networks and archives would be able to overcome massive electronic or magnetic attacks, which can occur even in warless times, e.g. as a result of terrorism. The internet is a good tool for a healthy society in times of peace, but we should remember that it started as a military initiative. If conditions require it, it is likely that the military world will have the power to again take control of it and may decide to stop it, at least for some time or in some places.

Even in times of peace, it is likely that the internet will be more and more vulnerable to various kinds of problems or attacks. Let us just mention in passing the daily problems with the internet and electronic databases that everyone has experienced, including loss of data because of human errors, local mechanical and electric breakdowns, saturation of disks, ill-intentioned Web users, viruses and worms, etc. More worrying are the massive electronic power outages which are more and more frequent and concern more and more customers: 90 million in Brazil in 1999, 55 million in the U.S.A and Canada in 2003, 56 million in Italy in 2003, 100 million in Indonesia in 2005, 60 million in Brazil and Paraguay in 2009, not to mention hundreds of others of smaller magnitude. Governmental internet cuts can occur in some countries at some periods. Cyber attacks are becoming more frequent against individuals, companies or states and will probably become more efficacious in the coming decades. Terrorist actions or acts of war using electro-magnetic pulses (E-bombs) may disable the whole electronic network of a city or a country.

All these potential problems are unlikely, and all have technical solutions, but this is a matter of choice. These technical solutions are very costly, especially if a high level of security is sought. Military, governmental or financial infrastructures may have the means to make such major investments to protect their electronic databases but is this the case for the taxonomic community? And, even if the Commission were able to raise the high amounts of money required, the question would be would Zoobank be the best investment for such funds in the service of taxonomy in the century of extinctions? No doubt 'collecting new species in the field will remain the rate-limiting step' for the inventory of biodiversity (May, 2004), so that this should be the priority and urgency for our discipline in this century (Dubois, 2003). Above all, this requires the creation of professional positions for taxonomists,

supporting field work and museums for the safe storage of specimens, tissues and information.

Anyone who has practiced mountaineering knows that one should never drop one hand before the other is secure. The permanency of nomenclatural information is too important for communication in biology and society as a whole to abandon paper publications. It is extremely useful that these can now be duplicated and distributed worldwide by online access to documents and databases, but they should not be replaced by them. The present situation, with two parallel worlds, should be maintained as such for several decades at least before deciding a possible shift to an all-electronic communication and archiving world, if it has shown its mettle.

Before considering any possible change in the basic rules of the Code concerning availability, a very strong case should be made, documenting over a long period the reliability, permanency, accessibility and financial health of electronic publications. Of course, the fact that nomenclatural availability is linked to paper publications does not impede in the least the spreading of the same works as PDFs or through other systems by electronic means, but these should not interfere with the very special process of nomenclatural availability.

This process of availability is distinct and independent from that of nomenclatural registration. As well argued by the supporters of the Zoobank project, this database, whenever complete and reliable, will be a very useful tool for all zootaxonomists and biologists worldwide. In order for it to be complete, all names and nomenclatural acts should ultimately be registered there, which explains the temptation once cherished by some members of the Commission to make it mandatory. How can registration, a new nomenclatural process, be combined with the other rules of the Code? For the coming decade, I suggest an alternative answer to that proposed by the Commission. This could be implemented without delay in the Code, without causing any problem or disruption in the functioning of the rules. After ten years, it will be possible to evaluate whether this change was sufficient to address all the problems which the new rules proposed by the Commission are supposed to solve, without creating any additional problems, or if the proposal of the Commission still has to be considered for implementation.

The three-floor structure of the Code

Although this is not yet mentioned in the Code, the nomenclatural status of any name according to the rules is established through a process that goes through three subsequent stages or levels, the so-called 'floors' or 'storeys' of the 'nomenclatural house' (Dubois, 2005a–c): availability, allocation and validity. This means that before being potentially the valid name for a taxon, any name must first have been made nomenclaturally available, and second allocated to one or several taxa.

The Code has been functioning according to this system since its creation, but, because this structure in three floors has never been identified clearly in the Code, confusions have regularly been made regarding the proper use of the rules, e.g. between availability and validity of names, or between objective ostensional allocation of names to taxa through onomatophores ('name-bearing types') and subjective allocation of names to taxa through intentional or extensional 'definitions of names' (Dubois, 2008d). Examples of such confusions were analysed elsewhere (Dubois &

Ohler, 2000; Dubois, 2006, 2007b). The fact that such gross mistakes can appear in well-known and highly-ranked periodicals, or in famous and often-quoted books or online databases, highlights the existence of strong problems regarding the understanding of the basic process of the Code, and solutions to these problems should be sought. It is now more than time that the Code be modified in order to become clearer for all users, and Dubois (2008a,c) suggested that one possible way to do so would be to change the plan of the Code.

The plan used in the Code is a non-hierarchical one. This book consists in three introductory texts followed by the Code itself, containing a Preamble, 18 chapters, a Glossary, a sketch giving a 'Summary of the status of works, names and nomenclatural acts' (p. 123) and two Appendices. The 18 chapters are presented in an order that has remained unmodified through successive editions and modifications of the Code. This order is not logical and does not help the readers and users of this book to understand clearly the way the Code works. The sketch on page 123 provides a clear survey of the logical structure of the Code, but, although it is part of the latter, it appears at the end of this document, between the Glossary and Appendices, and is never referred to in the chapters giving the rules themselves, so it probably remains unnoticed by most readers and users of the Code.

The Code in fact contains six different kinds of items: (1) a few general *Principles*, which are the 'philosophical basis' of the whole work; (2) a rather high number of *Rules*, which correspond to the concrete implementation of these general Principles with respect to the various situations and problems encountered in zoological nomenclature; (3) a rather high number of *Exceptions* to these Rules, with explanations about the dates and situations when and where they apply; (4) various *Examples* that are meant to clarify some Rules or Exceptions; (5) various *Recommendations* (including a Code of Ethics in Appendix A), which do not have the binding force of Rules but that zoologists are encouraged to follow; and (6) a *Glossary* giving the definitions of some (not all) technical and non-technical terms used in the book. Except for the Glossary and for some of the recommendations that appear in the Appendices, all these pieces of information appear intermingled in the chapters, without any hierarchical presentation.

This plan is not good, a fact that had been clearly stressed already 25 years ago by one commissioner (Dupuis, 1984), but without any result. For a better understanding and use of the Code, drastic changes in the structure and presentation of this text should be considered. It would be necessary first to present clearly the Principles on which this text is based, in an introductory chapter, as is the case in the International Code of Botanical Nomenclature (McNeill et al., 2006). Each of these Principles concerns only one of the three stages of the nomenclatural process, availability, allocation and validity of names. Then the book should be divided in three major parts corresponding to these three floors, not in 18 chapters in an illogical order. Most of these chapters only concern one of these three stages, but a few are heterogeneous in this respect. Ignoring these minor problems and putting apart the introductory chapter C1 (Zoological Nomenclature) and the two concluding chapters (C17 The International Commission on Zoological Nomenclature; C18 Regulations governing this Code), the 15 other chapters can be distributed as follows regarding the floors of the nomenclatural process to which they apply, either in full or in most of their content (as some are heterogeneous in this respect):

Floor 1, Availability of names: C2 The number of words in the scientific names of animals; C3 Criteria of publication; C4 Criteria of availability; C5 Date of publication; C7 Formation and treatment of names; C8 Family-group nominal taxa and their names; C9 Genus-group nominal taxa and their names; C10 Species-group nominal taxa and their names; C11 Authorship.

Floor 2, Allocation of names: C13 The type concept in nomenclature; C14 Types in the family group; C15 Types in the genus group; C16 Types in the species group.

Floor 3, Validity of names: C6 Validity of names and nomenclatural acts; C7 Formation and treatment of names; C8 Family-group nominal taxa and their names; C9 Genus-group nominal taxa and their names; C10 Species-group nominal taxa and their names; C12 Homonymy.

The illogical structure of this plan is clearly apparent through the fact that the numbers of the chapters are not in a continuous sequence in the lists of chapters of each of these three floors above. To take just an example, the place of chapter 6 is completely wrong. How can a user understand the way validity of names works without first knowing how names are allocated to taxa? This chapter should come as the last but one chapter of the whole, just before chapter 12 on homonymy, that should be followed by articles dealing with the correct spelling of names (distributed in Chapters 7 to 10). Thus, for more clarity, the chapters should be renumbered and arranged according to the three parts outlined above. Many other changes should also be implemented into most of these chapters and in the arrangement of the latter, but these technical points need not be discussed here in detail.

Registration as a fourth floor of the Code

It is important to distinguish two fully distinct aspects in Zoobank:

(1) Zoobank will provide a database for zoological names and nomenclatural acts. If ever complete or almost so, and reliable concerning the information provided, such a database will undoubtedly be very useful to all taxonomists worldwide. This point is not discussed here.

(2) The Commission proposes a drastic change in the rules of nomenclatural availability of zoological names, regarding names and acts first published electronically and not on paper. For the availability of such names and acts, online registration in the Zoobank database would be mandatory. This project, which would change one of the bases of the Code, is questioned here.

A complete database including all zoological names (from variety and form to class and phylum) and all nomenclatural acts validly published after 1757 would of course be a very useful tool for taxonomists worldwide. However, as noted above, incorporation of all available names, associated with basic nomenclatural (first-revisers action, homonymy, objective synonymy) and taxonomic (subjective synonymy, subordinate and superordinate taxa currently recognised) information, is an enormous work, which will require appropriate funding as it cannot be a voluntary work asked from individual zoologists. The same applies to the registration of newly published names, which is not easy for example for zoologists in countries where access to the internet is intermittent or costly, even in times of peace (see Funk et al., 2005). It can be argued that authors who would first publish a new name in electronic format would indeed have access to the Web, but it is not difficult to predict that, in the minds of some commissioners at least, this proposed new rule is only a first step

towards the goal of rendering mandatory the registration of all new names and acts, even if published on paper. This option had indeed been vigorously defended by some contributors of the early discussions on the Zoobank project, in the BZN and in online forums.

I strongly feel that availability of names must remain attached to a single publishing act. For this, paper publication, which has existed for hundreds of years and which will no doubt exist as long as human civilisations, is doubtless the best one. Allowing two different systems (paper and electronic), and furthermore linking one of them with a second condition (registration), is an awkward and dangerous system, in fact a reliable recipe for chaos. What will occur if only one of the two conditions is met, e.g. only online publication but no registration? Unavailability? But who will know? Among the candid users of the internet, who will make the difference between (1) publication on an authorised online medium ('with fixed content and format', according to the proposed new Article 8.1.3.2), coupled with registration, (2) simple publication on an unauthorised online medium, and (3) simple registration not followed by online or paper publication? These discrepancies may proceed from inadvertent errors, from problems concerning the author (health problems, change of work or address, death) or even from deliberate refusal to register.

Under the current Code, it is already a very specialised work to check that all conditions of availability, beside paper publication, are met. There is no need to add others. Of course, specialists of nomenclature would be, or should be, able to notice these new problems, and to recognise that names and acts in the categories (2) and (3) are unavailable. However, this will require from them a double checking, in the electronic publication and in Zoobank, whereas for the time being any experienced taxonomist can know if a name is available by simple examination of the original paper publication. But how many candid users of names will be able to do this? If such a complicated system were implemented, it can be predicted that it would create many confusions and problems in online documents, including non-taxonomic online or even paper publications that make use of zoological names, and the editors of which do not have the proper competence in nomenclature. This system must be abandoned and a new one proposed, for establishing a simple, proper use of registration in the nomenclatural process. In other words, registration must be completely disconnected from availability.

My proposal is to consider registration of names and nomenclatural acts as a fourth floor of the nomenclatural process, independent from availability, allocation and validity. Availability would remain attached to paper publication, with numerical criteria regarding the number of required printed copies and library deposition, as discussed above. A name just published electronically, or in too few paper copies, would remain unavailable, as in the current Code. Electronic registration would be an independent step, which would change the status of the name from unregistered to registered. The practical consequences of registration would be that the name or nomenclatural act would then appear in Zoobank, and be protected against potential oblivion by the international community, thus from falling under the possible use of the *nomen oblitum* Rule to invalidate it in case of absence of use.

Implementation of this proposal would imply only minimal changes in the Code. Registration of names and nomenclatural acts would be entirely voluntary. It could be carried out by the authors of the new names, by the editors of the concerned

publications, by the Commission, or by any zootaxonomist worldwide, for example on the occasion of a first use of a nomen, if the latter has not been registered previously.

Registration of names on Zoobank will no doubt be exerted through electronic connection to the site of Zoobank, and the content of this site will be available online. However, for the reasons stated above regarding electronic publication, I think this database should not exist only in electronic form. I suggest that, every year, a volume be published by the Commission, including all the names and nomenclatural acts, as well as all additions and corrections to the previous situation, entered in this database during the preceding year. This yearly paper volume of Zoobank would be sent free to a group of libraries (e.g. as suggested above, 40 distributed in 8 main regions of the world), and could be available by subscription or purchase by other libraries or individuals. The price should remain moderate, so that many libraries, especially of institutions devoted to taxonomic research (in particular museums), could subscribe.

Registration and the Reversal of Precedence Rule

What would be the long-term consequences for a name not to be registered? I suggest that, after a fifty-year period, this nomen, if unused in zoological taxonomy and in concurrence for synonymy or homonymy with another name used in taxonomy, could be rejected as a nomen oblitum under the 'Reversal of Precedence' procedure. This would require some modification of Article 23.9.

For the time being, this Article can only be applied to reject as nomen oblitum a name unused as valid after 1899, so that it cannot apply to a name created after 1899, which by definition was used as valid at least once. This Article in its current wording is not satisfactory, for reasons explained in detail elsewhere (Dubois, 2010b). It could be modified in two directions, in order (1) to protect really widely used names, even if only for half a century, against the potential threat of older synonyms or homonyms, but (2) also to avoid protecting obscure names that have been used only a few times, especially by a small group of colleagues.

Hence the suggestion (Dubois, 2006a, 2010b) that, to be liable to be protected under this Article, a name should have been mentioned as available (not valid) and used (1) either in the titles of at least 25 not purely systematic books, written by at least 25 independent authors from at least 10 different countries; (2) or in the titles of at least 100 not purely systematic publications written by 100 independent authors from at least 10 different countries. Dubois (2006a) provided detailed justification of the choice of these numbers and of the restriction to not purely systematic publications. The numbers recommended may appear high at first reading, but for really well-known names like Amphibia, a single year is more than sufficient to meet this criterion. If it is not met after 250 years of taxonomy, the name cannot honestly be considered 'well-known'. These figures can be discussed, but what is important here is that, to be eligible for validation, a name should really have been widely used at international level by many non-specialists, and no other name should have been similarly used for the same taxon. Whenever such conditions are indeed met, the rules of the Code should allow automatic and permanent validation of the well-known nomen, through 'Reversal of Precedence' in many cases, or through other nomenclatural actions in some rarer cases (e.g. change of author and date, or of onomatophore, whenever the latter is found not to correspond to the widespread use of the nomen).

Addition of the fourth floor to the Code would have a strong consequence upon this Article: once registered, a name would be protected against Reversal of Precedence as, being included in Zoobank, it could not be considered 'forgotten'. Therefore, Article 23.9 should be stated to apply only to unregistered names. If, at the time of publication of a taxonomic work, an unregistered name threatens a junior registered synonym or homonym, with numbers of uses corresponding to the conditions above, the former could be invalidated as a *nomen oblitum* and the latter validated as a *nomen protectum* on the basis of this Article. This could be done by any zoologist worldwide, without having to apply to the Commission. Subsequent registration of the invalidated name would be possible, but would not allow nullification of the Reversal of Precedence so executed.

On the other hand, in cases of subjective synonymy, the invalidation of a junior synonym according to this Article would be liable to be nullified if the synonymy is challenged. The same would apply to the situation of secondary homonymy: if a specific *nomen*, invalidated through this Article, was transferred to another genus where it would not be a homonym, then its nomenclatural status would have to be re-evaluated according to the new situation.

The protection against potential Reversal of Precedence should be a strong encouragement for zoologists to register their new names, as well as all the other names created by colleagues which they use in their works and that might not yet have been registered. For this purpose, registration can take place at any date during the fifty years following the valid publication of the *nomen*, as the date of availability of a *nomen*, which is the only one relevant for priority, would remain attached to the original date of paper publication, not to the date of registration.

Finally, it must be stressed that registration of a name would not protect it against potential synonymisation with a senior registered synonym, nor with invalidation because of the existence of a senior registered homonym. This situation would be the same as that of a *nomen*, once placed by the Commission on one of its Official Lists to protect it from an invalidated senior synonym or homonym, but which may nevertheless be later invalidated as a result of taxonomic changes that make it become a junior synonym or secondary homonym of another widespread and well-established *nomen*.

Registration and authorship

Registration, as described above, is a nomenclatural act, distinct from that of publication of a *nomen*, and always subsequent to it. Both a publication and a name have an author (which is a signature, not a person, and therefore can be composed of several names: see Dubois, 2008b). A given name may be modified by subsequent authors, either in its onymorph (Smith & Pérez-Higareda, 1986), e.g. whenever a specific name is combined with a different generic *nomen*, or in its spelling, e.g. whenever a family name is used at suprafamilial, subfamilial, tribal or subtribal rank. Such modified spellings or onymorphs are not properly new names, as they have the same author, date and onomatophore as the original name or protonym (Dubois, 2000). They qualify as aponyms, and they do not have authors, but first-users and dates (Dubois, 2000). The nomenclatural act of registration also has a date, and is to be credited to a registrant, which is one or several persons. The date of registration has no bearing on availability, on priority and hence on validity, except in the case

of a registered name being threatened by another senior name that has not been registered 50 years after its publication, in which case Article 23.9 (Reversal of Precedence) may be called upon.

Discussion

In November 2007, the Linnean Society organised in London a meeting on the registration of names, and a motion was put to the vote, first before and second after the debate, asking whether nomenclatural registration should be made compulsory. Six orators spoke to present the experiences in this domain and to support compulsory registration, and finally two orators spoke on the motion itself, one (McNeill) for and one (myself) against. This Bulletin provided an account of this meeting (Hawksworth, 2009), but only the texts of the first six talks, which were all in favour of mandatory registration of names, were published. Interestingly, I was not invited to provide the text of my proposed lecture at this meeting (Dubois, 2007c). A very brief, and incomplete (ignoring some important points of my talk), summary of it was given, which makes it difficult for the readers to understand how a single orator against 7 could have convinced part of the audience to change their mind. Some of the arguments I developed then appear above, and others were mentioned independently by Welter-Schultes et al., so they are not repeated here. I concluded my lecture in London with the sentence: 'It is urgent to wait!'. In response to some statements published in this Bulletin, I stated that the 250th anniversary of Linnaeus's tenth edition should not be used as a pretext to impose stealthily a basic reform in zoological nomenclature that had been discussed only by a small group of colleagues and the intention of which was unknown to most zoologists worldwide, and opposed by some of those who had heard about it. Such a change would be so drastic that it could be adopted only during a plenary general meeting of a world congress convoked especially for this purpose, after wide publicity in all zoological journals of the world for at least one year before the vote. Perhaps voting should also be possible by mail or e-mail, but drastic criteria of control of voters through this medium should be thought of and implemented, to avoid lobbying and manipulation. Let us remember that, when asked to vote on a similar proposal, botanists, who have a more democratic system for changing their Code than zoologists (through international congresses, not through a Commission composed of co-opted members), rejected it, but this did not change the attitude of the 'responsibles' in favour of it (see Hawksworth, 2009). Is this because important financial benefits can be expected in the medium or long term for the companies that will provide and care for the sites where registration will be made? Of course, we all know that we live in a historic period when, if a majority of voters refuses a proposal (e.g. in recent national votes in France or Ireland), they may be asked to vote again until the result has the agreement of the power. But science should remain outside such a lamentable process.

In the past, the Commission has made a number of errors and taken a number of questionable decisions. This has nothing surprising or shocking, as any person or human group is liable to make mistakes; the only way not to make errors is not to do anything. A striking mistake made by the Commission in recent times was the decision to allow the availability of names or nomenclatural acts through publication on laser-disks such as CD-ROM and DVD. This was implemented in the fourth

edition (1999) of the Code, and the Commission now proposes to disallow such publications as of 2009. So this new rule has been in force for a ten-year period only, after 1999 and before 2010. If anything, this shows that this change had been decided too hastily, and this problem could have been avoided if the decision had been postponed for a few years or decades. However, it does seem that the lesson of this failure has not been learnt. The Commission seems to be eager to stick to 'modern techniques' and to follow the emergence of new processes of publication and archiving of data and documents. The urgency of such decisions is questionable, if some of them happen to be nullified ten years from now. At any rate, this certainly does not encourage support of the proposed new Article 8.6 of the Code, which would allow the Commission alone to decide to accept new methods of production, distribution, formatting and archiving to confer nomenclatural availability. Just like the proposal of online publication, such new proposals should be thought about collectively and for a sufficient period by the whole community of zoologists, and decisions should be taken during an international congress.

Conclusion

In conclusion, I warmly support the opinion of Welter-Schultes et al., according to whom nomenclatural availability should remain attached to paper publication and not allowed by electronic means of any kind (whether on physical support like CD-ROM or DVD, or through electronic communication online). Furthermore, precise numerical criteria should be implemented for allowing a paper publication to provide nomenclatural availability, as detailed above.

As for registration of names and nomenclatural acts in Zoobank, it should be completely disconnected from the first three floors of the nomenclatural building (availability, allocation and validity) and should constitute a fourth, independent floor. Registered names would be protected from oblivion, and in particular from potential invalidation by Reversal of Precedence in case they threaten well-established junior synonyms or homonyms used for at least 50 years in a significant number of non-taxonomic publications. The precise numerical criteria for such cases are proposed above.

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